

WATER AND SEDIMENT CONTROL BASIN (No.) (638)Definition

A short earth embankment or a combination ridge and channel generally constructed across the slope and minor watercourses to form a silt or sediment basin.

Scope

This standard applies to the planning, designing, and construction of water- and sediment-control basins. It does not apply to Diversions (362), Grade Stabilization Structures (410), Sediment Basins (350), or Terraces (600).

Purpose

To trap and collect sediment, reduce onsite erosion, reduce the content of sediment in water, reduce peak rate of flow at downslope locations, reduce flooding, reduce gully erosion, reform the land surface, and improve potential of areas for farming.

Conditions where practice applies

This practice applies to sites where:

1. The topography precludes installing and farming terraces with reasonable effort,
2. Runoff and sediment from high areas can damage downstream land or improvements,
3. Water erosion is a problem,
4. Site conditions are suitable for installation, and
5. Adequate outlets can be provided.

Design criteria

Generally, water- and sediment-control basins shall be used on cropland where the topography prohibits terrace construction and farming with reasonable effort. Water- and sediment-control basins shall not be used in areas that are suited to terrace systems.

In areas where the climate, the soils, and the crops grown are suited to gradient terraces, water- and sediment-control basins may be constructed if they are to be used in combination with planned cultural and management practices. These practices, including residue management systems and crop rotations, must adequately reduce soil loss to acceptable limits in the interval above and between the basins without requiring excessive maintenance.

In areas where level terraces can be satisfactorily constructed, water- and sediment-control basins may be used in combination with planned cultural and management practices such as residue management systems and crop rotations. These practices, must adequately prevent loss of soil from the intervals above and between the basin without requiring excessive maintenance.

Spacing - The spacing for water- and sediment-control basins depends on the predominant land slope, the cross section, and the tillage and management system used.

The embankment and the row arrangement shall be approximately perpendicular to the principal slope of the land. In so far as possible, rows must be on the contour but must permit operation of modern machinery. If water- and sediment-control basins are to be used in conjunction with existing or planned terraces, the spacing shall be compatible with the appropriate terrace spacing.

Alignment - The ridge or embankment of each basin shall be nearly perpendicular to the principal land slope, permitting rows to be farmed as closely on the contour as possible. If feasible, systems of water- and sediment-control basins shall be parallel.

Cross section - Embankments may consist of a broad-base configuration in which both the slopes and the top are suitable for farming or of a configuration in which one slope or both is steep and vegetated. The constructed height of the embankment shall be at least 5 percent greater than the designed height to provide for settlement. Vegetated slopes shall not be steeper than 2:1.

The effective top width shall be as follows:

Fill height	Effective top width
ft	ft
0-5	4
5-10	6
10-15	8

The maximum settled fill height shall be 15 feet, measured from the natural ground at the centerline of the ridge.

Capacity - The capacity of the basin shall be large enough to control the volume of runoff expected for a 10-year, 24-hour-frequency storm from the contributing drainage area without overtopping. Unless provisions are made for periodic cleaning of the basin to maintain the design capacity, the capacity shall be increased to permit storing the anticipated 10-year sediment accumulation. The capacity of basins designed to provide flood protection or to function with other structures shall be adequate to control a storm of a frequency consistent with the potential hazard.

End closures - Water- and sediment-control basins shall have ends closed to the elevation needed for the design capacity. A minimum of 1 foot of freeboard will be added to the design height to provide for an emergency spillway around one and preferably both ends of the basin. The emergency spillway shall not contribute runoff to a lower basin in series that does not have an emergency spillway.

Outlets - Water- and sediment-control basins shall have underground or soil infiltration outlets that meet the requirements specified for Terraces (600) and Underground Outlet (620).

Vegetation - Disturbed areas that are not to be farmed shall be established to grass as soon as practicable after construction. If soil or climatic conditions preclude use of vegetation and protection is needed, nonvegetative means such as mulches or gravel may be used. Seedbed preparation and seeding, fertilizing, and mulching rates shall comply with recommendations in other sections of the South Dakota Technical Guides. Sod shall be maintained and trees and brush controlled by chemical or mechanical means.

Maintenance - A program shall be prepared for maintaining the embankment, the design capacity, the vegetative cover, and the outlet.

After each large storm basins shall be checked and needed maintenance performed. Basins shall be either cleaned out or the ridge must be raised to restore capacity when the storage provided for sediment has been used. Excavations for fill material shall be made in a manner that enhances the topography and suitability of the area for farming.

Fence Structure for Gully Control

Application: Fence structures are generally applicable where vertical control height is low, required capacity is usually moderate to low, and site conditions or economics make a lower maintenance solution too impractical.

Design: These structures shall be located on a reasonably straight section of channel or drainageway. They are limited to use where headcuts are four feet or less in height and flow is intermittent. When located downstream for a gully headcut or overfall, the structure shall be placed so that the structure crest elevation will be equal to or above the top of the headcut or overfall. Minimum design capacity shall be as follows:

Maximum Flow Depth (feet)	Vertical Drop (feet)	Frequency of Design Capacity (years)
2	4 or less	10

Job Plan 15.0 has been developed to be used as the construction specifications.

Operation and Maintenance O&M - Operation and maintenance is extremely important to the proper performance of this type of structure. The operator should be informed that hay, bales, or brush need to be replaced on the upstream side of the structure if decay or dislodging occurs. If livestock tend to use posts or chain-link fencing for rubbing, barbed wire may need to be stapled to the top of the posts to protect the chain-link fence. Anchors should be maintained and strengthened if signs of weakening are noted. Cattle "Oilers" may need to be considered if cattle cause reoccurring need for maintenance. The structure should be inspected and necessary maintenance performed following each major runoff event.

Planning considerations for water quantity and quality*Quantity*

1. Effect on the water budget, especially on volumes and rates of runoff, infiltration, and evaporation.
2. Ability to increase deep percolation below the root zone and, where possible, ground water recharge.
3. Potential for a change in rates of plant growth and transpiration because of changes in the amount of soil water storage.
4. Effects on the trapping or distribution of snow.

Quality

1. Potential to trap sediment and sediment-attached substances carried by runoff.
2. Potential change in the flow of dissolved substances such as nitrates or pesticides into downstream water courses.
3. Potential movement of dissolved substances to ground water.
4. Effect on downstream water temperature.
5. Effects on the visual quality of downstream water resources.